The United States Department of Transportation (U.S. DOT) selected seven research projects in response to a Broad Agency Announcement (BAA) that will expand the ability of Intelligent Transportation Systems (ITS) applications to improve environmental performance. The objectives of the BAA are to:

- Foster innovative research on ITS applications that improve environmental performance, and possibly develop new applications;
- Promote capture and management of real-time data that are relevant to environmental applications development and performance measurement; and
- Support development and enhancement of evaluation techniques, performance measurement, and technologies to capture environmentally-relevant data.

The seven projects and awardees are:

**ECO-ITS – University of California - Riverside (UCR)**

Previous UCR research developed a microscopic emissions model Comprehensive Modal Emissions Model (CMEM) capable of predicting second-by-second fuel consumption and tailpipe emissions. This study will build upon previous research to synthesize results and recommend the following: data collection methods; environmental analysis methods; integration of simulation and environmental modeling tools; and suggestions for environmental ITS applications and strategies.

**Developing Eco-Adaptive Signalized Intersection Algorithms – Virginia Tech**

This study will develop and evaluate an innovative application for eco-adaptive signal control using traffic simulation tools. These systems would be modeled using traffic simulation software and tested for different roadway configurations (local streets and signalized arterials). Activities include: conducting a literature review; developing signal control logic that will inform the vehicle of a potential change in signal timing; testing algorithms for different vehicle types, different communication ranges, and different types of logic; and analyzing simulation results.

**Engaging the International Community – University of California Partners for Advanced Transit and Highways (PATH) Program (UC Berkeley)**

The goal of this study is to collaborate with the international community through direct interactions and through support to U.S. DOT. Activities include: preparing for and attending the International Symposium on Evaluation of CO₂ Emission Reduction with ITS Applications; and developing a technical report and action plan based on US, European, and Japanese experiences that focuses on ITS applications & reference models, traffic simulation and modeling, emissions modeling, probe monitoring systems, validation methodologies and international data warehousing activities.
Research on ITS Applications to Improve Environmental Performance – Mixon/Hill and Texas Transportation Institute (TTI)

This project will investigate extracting environmentally relevant real-time data from vehicles and then calculating performance measures (based partly upon previous research projects. Activities include: identifying available environmental data sets from connected vehicles; determining the relevance and values of the data sets; determining the gaps in available data; and developing a preliminary system design plan for a transportation-relevant environmental data capture management system.

Developing and Evaluating Intelligent Eco-Drive Applications – Virginia Tech

This project will build on previous research efforts to develop an eco-ACC system and evaluate the network-wide impacts of such systems for different levels of market penetration and network configurations. Various simulation tests will be conducted to investigate how these systems will operate within a transportation network, while interacting with other vehicles that are not equipped with such systems. Activities include: integrating predictive eco-cruise control algorithms within state-of-the-art car-following models; developing optimum vehicle acceleration and deceleration controllers; testing the controllers on different vehicle types; and developing a final report summarizing the findings of the study.

An Evaluation of Likely Environmental Benefits of Lowest Fuel Consumption Route Guidance in the Buffalo-Niagara Metropolitan Area – SUNY-University at Buffalo

This study will conduct an assessment of the likely environmental benefits of a new application for an environmentally-optimized route guidance system for a medium sized metropolitan area. Activities include: developing an integrated simulation modeling framework capable of calculating time-dependent fuel consumption factors; using TRANSIMS-MOVES2010 modeling to estimate environmental benefits to be expected from implementing low fuel consumption routing; assessing the impact of market penetration on the likely benefits of the strategy; assessing additional benefits to be expected from taking into account real-time information about traffic disturbances; and assessing modal benefits.

Research on ITS Applications to Improve Environmental Performance – University of California - Riverside and Calmar

This project will investigate the use of real-time, on-vehicle data to calculate environmental performance measures based partly upon the team’s Combined Network Equilibrium Model (CNEM). Activities include: determining the effort, scope, and geographic requirements and limitations required to transform UCR’s modeling structure from a static system into a real-time system; contacting commercial vehicle telemetry companies and summarizing the general availability and types of data required for improved environmental monitoring; evaluating data structures (data fusion requirements) and assessing potential changes; and developing a technical report and recommendations document.